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Abstract

During the Great Recession and its aftermath, state and local governments' revenue streams dried up due to diminished taxes. Budget cuts affected many aspects of government; in this paper, we investigate whether (and how) local school districts modified their funding and taxing decisions in response to changes in state aid in the post-recession period. Using detailed district-level panel data from New York and a fixed effects as well as an instrumental variables strategy, we find strong evidence that school districts did indeed respond to state aid cuts in the post-recession period by countering the cuts. In comparison with the pre-recession period, a unit decrease in state aid was associated with a *relative increase* in local funding per pupil. To further probe the school district role, we explore whether the property tax rate, which districts set each year in response to budgetary needs, also responded to state aid cuts. Indeed, we find that relative to the pre-recession period, the post-recession period was characterized by a strong negative relationship between the property tax rate and state aid per pupil. In other words, after the recession a unit decrease in state aid was associated with a relative increase in the property tax rate in the post-recession period (in comparison with the pre-recession period).

Key words: school finance, Great Recession

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1 Introduction

The effects of the Great Recession on the U.S. economy were both widespread and dramatic. State and local governments were hit hard by the loss of income tax, property tax, and sales tax revenues that resulted from the recession. State and local governments generally provide the vast majority of public school funding, so the recession left schools especially vulnerable to funding losses. Chakrabarti and Livingston (2013) finds that there were multi-year declines in state aid to education following the Great Recession. The objective of this paper is to study the interactions of state funding and local revenue, and whether the relationship between the two changed in the post-recession period. More specifically, we examine whether the declines in state aid after the recession affected local districts' fund-raising behavior. Did local governments, specifically school districts, respond to cuts in state funding for education, and if so, how? Did they use local revenue and property taxes to counter the decline of state aid?

It is not necessarily clear *a priori* how the Great Recession and the resulting cut in state aid would affect local property taxes and revenues. On the one hand, school districts faced a shortfall in revenue from the state relative to what they normally received and they may have wanted to replace some of the lost state funds with local funds to avoid having to cut services. On the other hand, the decline in state aid came precisely when property values were plummeting, diminishing the tax base making it harder to increase property tax revenues. Moreover, many people had lost their jobs, likely making them more averse to increased property taxes. Ultimately, how the recession affected the relationship between state aid and property taxes is an empirical one, and we aim to leverage our dataset to provide some insight in this paper.

We seek to answer this question by analyzing a detailed district-level panel dataset of New York school districts. New York State is of interest for a variety of reasons. It contains New York City, the nation's largest school district, serving over 1 million students. New York is also the third largest state school system, serving 5.5% of the country's students.[5] Additionally, New York districts vary widely in terms of wealth, demographics, and urbanization.

This paper builds on the literature studying school district funding. Stiefel and Schwartz (2011) finds evidence of large increases in per-pupil funding by examining school finance patterns in New York City during the Bloomberg era. Rubenstein et al. (2007) studies schools in NYC, Cleveland, and Columbus and find that higher poverty schools receive more funding per-pupil. Baker (2009), studying Texas and Ohio schools, finds that districts with higher student needs receive more resources. Papers (Chakrabarti and Livingston (2013a), Chakrabarti and Livingston (2013b)) specifically analyzing the impact of the Great Recession on school finances found that there were significant downward shifts from pre-recession trends in funding and expenditure. They find that not only non-instructional expenditure categories, but instructional expenditure also declined sharply relative to the pre-recession trend.

The paper most directly related to ours is Dye and Reschovsky (2008), which brought to the surface the issue of substitution of local funds when state funds decrease during recessions. Dye and Reschovsky analyze the effect of state fiscal crises resulting from the 2001 recession on property tax revenues raised by districts and local governments. They find that, on average, school districts increased property taxes by 23 cents for every dollar lost in state aid.

While this paper has been greatly informed by Dye and Reschovsky (2008) and builds on it, it differs from Dye and Reschovsky (2008) in some key ways. One is the granularity of the data—while we exploit district-level data, Dye and Reschovsky used state-level data. We also

[5] Authors' calculations using NCES CCD 2012 (http://nces.ed.gov/pubs2012/2012327.pdf)

have a longer panel spanning eight years (2005-2012), while the main analysis in Dye and Reschovsky contrasted events in 2002 to 2004. The availability of a longer panel enables us to control for any pre-existing trends, as well as investigate whether the relationship changed with time after the post-recession period. Second, since we focus on one state in particular, we avoid the problem of having differential patterns across states masking the overall effect. Another fundamental difference is the period of analysis—the 2001 recession that Dye and Reschovsky analyze was far less severe than the Great Recession. Finally, we employ a more rigorous estimation strategy. We start by utilizing district fixed effects estimation (FE) to control for time-invariant unobserved district characteristics that might affect the relationship. Next, to further eliminate any endogeneity problems, we pursue an instrumental variables estimation strategy (IV).

We find that the relationship between state funding and local revenue changed drastically during the Great Recession. Robust evidence demonstrates that local revenue and property taxes responded to the decline in state aid following the recession. State aid and local revenue were positively related prior to the recession, implying a unit decrease in state aid would lead to a decrease in local revenue, and vice versa. In the post-recession period, while this positive relationship was maintained, a unit decrease in state aid reduced local revenue considerably less and this difference was both economically and statistically significant. In other words, we find that in comparison to the pre-recession period, a unit decrease in state aid was associated with a *relative increase* of 35 cents in local funding per pupil, and a relative increase of 31 cents in property tax revenue per pupil.

To further investigate the role of local control, we explore whether changes in local revenue were associated with changes in the actual *property tax rate*. Notably, we find a strong response for property tax rates. We find that relative to the pre-recession period, a decline in state aid per pupil led to a relative increase in property tax rates in the post-recession period. We believe that by separately considering the tax rate, we are able to determine whether the change in property tax revenue was a result of local tax policy decisions or simply changes in home prices. As outlined above, we indeed find that districts changed their tax rates in response to state aid shifts.

2 Background

2.1 Economic Background

Much has been written about the Great Recession and its effects; here we provide an overview of some of the broader patterns and then describe in greater detail how schools were affected by the recession. The bursting of the housing bubble in 2007 and subsequent financial crisis led to a surge in unemployment and a decline in house prices. The rise in unemployment and fall of consumption meant less income and sales tax revenue for state governments, while the collapse of housing prices led to property tax revenue declines. New York's unemployment rate increased from 4.6% in 2006 to a peak of 8.5% in 2010. Since the peak in 2010, unemployment has fallen from its peak to 7.4% nationally and 7.5% in New York as of July 2013.[6] As revenue streams dwindled, the federal government stepped in with the American Recovery and Reinvestment Act (ARRA, also known as the stimulus package), much of which was targeted at bolstering state and local government finances. However, as the stimulus dried up and the economic recovery continued to stall, many governments faced fiscal tightening.

2.2 School Funding Overview

[6] Source: Bureau of Labor Statistics/Haver Analytics.

Funding for public schools comes from three main sources: federal aid, state aid, and local revenue. Out of these three sources, New York districts received approximately 6% of their funding from federal aid, 37% from state aid, and 58% from local revenue over the period of our analysis (2005-2012) (see Figure 1). State aid and local revenue comprise the vast majority of school district funding, which makes schools very vulnerable to fluctuations in state and local budgets. State aid is determined based on a variety of characteristics of the school districts, including enrollment, varying regional labor market costs, low-income students, limited English proficient students, and income wealth of the district. Local revenue is composed almost entirely of residential and commercial property tax revenues. The largest school districts (Buffalo, New York City, Rochester, Syracuse, and Yonkers) do not fund schools directly from property tax revenue; instead the schools are funded as part of the city's budget (of which property taxes are one component).

The school districts' fiscal years end on June 30th. In the spring before the school fiscal year starts, the state passes its annual budget, which allocates, through a wide variety of programs and formulas, state aid for school districts. The school districts then draw up budgets and set their property tax rates to generate the amount of revenue needed to fund their operations. These are voted on and the tax rates go into effect in September. For a visual representation of the timing, see Figure 2. This timing sequence—local budgets being set after state budgets are finalized—allows us to study the response of local revenue to changes in state aid. The years of our data correspond to the end of the fiscal year (which is also the end of the school year), so a given year's state aid and property taxes were decided approximately one year prior.

3 Data

We construct our school district panel by combining district financial report data (ST3) with local property tax levy data, both from the New York Office of the State Comptroller. We obtain student racial demographic data and the percent of students on free or reduced lunch from the New York State Education Department. The resulting dataset covers 696 school districts spanning the 2004-05 to 2011-12 school years.[7]

The dataset includes a wide variety of variables relating to school district finances—in this paper we focus on state aid, local revenue, property tax revenue, and the property tax rate (taxes per $1,000 of property value).

4 Empirical Analysis

4.1 Examining the Relationship between State and Local sources of Funding

Table 1 presents summary characteristics of the various school finance and socioeconomic indicators used in this study in the immediate pre-recession year (2008). The average district received approximately $8,400 per-pupil in state aid in 2008, and raised approximately $14,000 per-pupil in local revenue, with $11,000 coming from property taxes. The average property tax rate was approximately 1.6% ($16 per $1,000 of property value).

We begin our analysis by examining the overall trends of our variables of interest. Figure 3 presents trend plots of the average state aid, property tax revenue, and local funding received by districts from 2005 to 2012, both in total and per-pupil amounts. In the years leading up to the recession, state aid, property tax revenue, and local funding were all on an increasing trend. After 2009, state aid declined sharply as a result of the Great Recession. Coincidentally, and interestingly, trends in both property taxes and local revenue showed a notably steeper increasing trend since 2009, just as state aid started to fall, and this pattern continued until the end of our period (2012). From these trend plots, it appears that local funding, through property taxes, may

[7] For the remainder of the paper school years will be referred to using the year of the spring semester.

have increased in response to the decline in state aid. We explore this relationship more formally below.

Before moving on to the regression analysis, it is instructive to examine the relationship as it appears in the raw data. To investigate whether the relationship changed over the years, we plot *by year* the basic relationship between the log of per-pupil local revenue and per-pupil state revenue (as well as log per-pupil property taxes and state revenue) after controlling for district fixed effects, demographics, and the percentage of students eligible for free/reduced price (Figure 4). Note that the plots show an overall positive relationship between local revenue (or property tax) per pupil and state aid per revenue. This pattern is consistent with Dye and Reschovsky's (2008) finding of positive correlation between these two variables for New York during their time period of consideration.

There is an interesting variation of this relationship across the years in our sample. While the relationship is steeper (more positive) in the pre-recession years, it is generally flatter in the post-recession years. This pattern holds for both local funding and property taxes. This is consistent with the hypothesis that following the recession, as state aid declined, local funding was substituted.

Next we explore this relationship more formally in a regression framework. We use the following specification:

$$Y_{it} = \beta_0 + \beta_1 StateAid\_pp_{it} + \beta_2 StateAid\_pp_{it} * Recession_t + \beta_3 X_{it} + \beta_4 Z_t + f_i + \varepsilon_{it} \quad (1)$$

Where Y_{it} is a school finance indicator (local revenue per pupil, property tax revenue per pupil, property tax rate) for each school district *i* in year *t*; $StateAid\_pp_{it}$ is the per-pupil state aid,

$StateAid\_pp_{it}$*$Recession_t$ is the interaction of per-pupil state aid and a dummy indicating the recession, equal to 0 before 2009 and 1 in 2009 and onward. X_{it} represents the vector of school district demographic characteristics (racial composition and the percentage of students eligible for free or reduced price lunch) and the percent of district funding coming from state aid; Z_t is the vector of year dummies, and f_i denotes district fixed effects. All financial variables are inflation-adjusted to constant 2012 dollars. All regressions use robust standard errors that are adjusted for clustering by school districts.

The results from this estimation are presented in Table 2. Looking at column 1 it does appear that while state aid per-pupil had a positive relationship with local funding prior to the recession, that relationship has weakened after the recession. We find similar results for property tax revenue (column 2), which had a positive but not statistically significant relationship with state aid and a negative significant relationship following the recession. This indicates that local governments were more likely to counter changes in state funding with opposite changes in local funding after the recession hit.

To further understand the relationship, we split the recession interaction into individual year interactions to study the effects separately in each post-recession year. If the negative relationship we found in the first specification occurs in only some of the post-recession years, that will be revealed in a more flexible specification such as the following, which allows for different post-recession year effects. Distinguishing between individual year effects also allows us to investigate whether the relationship changed over years in the post-recession period. The specification is as follows:

$$Y_{it} = \beta_0 + \beta_1 StateAid\_pp_{it} + \beta_2 StateAid\_pp_{it} * 2009 + \beta_3 StateAid\_pp_{it} * 2010 +$$
$$\beta_4 StateAid\_pp_{it} * 2011 + \beta_5 StateAid\_pp_{it} * 2012 + \beta_6 X_{it} + \beta_7 Z_t + f_i + \varepsilon_{it} \quad (2)$$

In this model, the coefficient on state aid per pupil captures the relationship between state aid per pupil and local revenue per pupil during the pre-recession period. The coefficients β_2 to β_4 capture the changes (if any) of this relationship in each of the post-recession years.

The results are presented in columns 3 and 4. Each post-recession interaction year has a negative coefficient; all are statistically significant for local funding and the latter two years are statistically significant for property tax revenue. The magnitudes are smaller than the pre-recession state aid coefficient, which indicates that in the post-recession years local revenue would still decline as state aid declined, but it would do so less strongly than it would have before the recession. Of note here is the last two year effects are economically somewhat smaller than the first two indicating a reduction of the response effect, but these latter years' effects are not statistically different from the immediate post-recession years.

In the final two columns of Table 2, we allow separate year effects for state aid for both pre- and post-recession years. More specifically, we estimate the following specification:

$$Y_{it} = \beta_0 + \beta_1 StateAid\_pp_{it} + \sum_{t=2006}^{2012} \beta_t StateAid\_pp_{it} * t + \beta_2 X_{it} + \beta_3 Z_t + f_i + \varepsilon_{it} \quad (3)$$

The state aid per-pupil coefficient thus represents the relationship in 2005, the omitted year in the interactions. These regressions show that relative to 2005, there were declines in the relationship between state aid and local funding before the recession, but the negative effects were economically stronger during the post-recession period. The relationship over time is clarified in the plots in Figure 5, which plot the state aid year interaction coefficients. These show how over time, and particularly after the recession, the relationship between state aid and local funding

became more negative (or less positive). A similar pattern holds true with property tax revenue, albeit with less statistical significance. These results imply that although during the post-recession period a unit decline in state aid per pupil would still be associated with a decline in local revenue per pupil (and property tax revenue per pupil), the extents of the latter declines were markedly smaller. In other words, it seems that the local government responded to cuts in state aid by increasing local funding effort.

Note that while fixed effects control for district specific time-invariant attributes, there may be endogeneity problems caused by unobserved time-varying characteristics that are correlated with local revenue and state aid. To address this endogeneity, we next implement an instrumental variables strategy, using the four-year lag of state aid per-pupil as the instrument for state aid per pupil. In specification (1) we have two endogenous variables, state aid per pupil and the state aid per pupil and recession interaction, which we instrument using four-year lagged state aid and four-year lagged state aid interacted with the recession dummy. In specifications (2) and (3), we use interactions of four-year lagged state aid per pupil with year dummies to instrument for the corresponding interactions of state aid per pupil and year dummies.

Table 3 presents results from the estimation of specifications (1) – (3) using the instrumental variables strategy discussed above.[8] All first-stage regressions have highly significant F-tests (all p-values are less than 0.01), indicating the validity of the instruments, and they all pass the Angrist-Pischke F-test of excluded instruments.

The results remain very similar to those obtained above (both qualitatively and quantitatively), thus demonstrating the robustness of the relationships. More specifically, consistent with the results obtained above, state aid has a positive relation to local funding and

[8] Because the R-squared has no natural interpretation in an instrumental variables context, we do not report them in our IV tables. See Wooldridge (2008) for further explanation.

property tax revenue, but that correspondence has weakened after the recession. The magnitudes obtained using instrumental variables technique are statistically stronger than those obtained from the earlier fixed effects model. The results in columns (1)-(2) indicate that a decrease in state aid per pupil by a dollar leads to a relative increase in the post-recession period in local revenue (property tax revenue) by between 35 (31) cents. In columns 5 and 6 we distinguish between the year effects in the various post-recession years. Each of the year effects are negative and statistically significant indicating that in the post-recession period, a unit decrease in state aid per pupil was associated with relatively larger increases in property tax per pupil in each of the years. This implies that the results above were not driven by effects in a stray year, but was a phenomenon that was inherent to the entire pre-recession period. As earlier, the effect seems to have been more moderate in the last year after recession (in our period of consideration). One explanation may be that the larger declines in state aid per pupil in the latter years made it difficult to keep up the substitution at an equal rate. However, note that the year effect in the last year is not statistically different from the earlier year effects. The coefficient plots in Figure 6 are analogous to those in Figure 5, the only difference being that they are derived from the IV estimation. The pattern of a negative shift in coefficients around the time of the recession revealed in Figure 5 holds true for these IV coefficient plots in Figure 6 as well.

4.2 Further Investigating Local Decision-Making – The Relationship between State Aid and the Tax Rate

We now delve into the components of property tax revenue. To understand whether the changes in property tax revenue we observed earlier were a result of school districts responding to changes in state aid, we need to investigate the impacts on the property tax rate. If state aid shifts observed above were not associated with relative increases in the property tax *rate*, then

the causal relationship we discovered above was likely spurious. On the other hand, if we find that the patterns above were indeed associated with such relative increases, then it will add confidence to our above findings that the local government indeed responded to state aid cuts.

The trend graphs in Figure 8 plot the property tax rate, which shows a sharp decline leading up to the recession, and then an equally sharp increase after 2010, which points to a potential response to the downward movement of state aid.

We estimate the same models as before, using the tax rate as the dependent variable. In columns 1 and 2 of Table 4 where we introduce district fixed effects, we find that prior to the recession, state aid has a positive relationship with the tax rate; after the recession that relationship diminished sharply. Decomposing the recession interaction into separate year interactions, we see that the pattern holds for each post-recession interaction, and in fact the substitution grew stronger over each year. Columns 2 and 3 continue to show that there was a positive relationship between state aid per pupil and the tax rate in the pre-recession period. In the post-recession period, while the relationship remains positive in the initial years, it is weaker. In other words, while a decrease in state aid per pupil would still decrease the tax rate, the extent of decline was smaller. Interestingly, in the last two years (2011 and 2012), the negative year effects completely negate the positive pre-recession relationship, and a decline in state aid per pupil was no longer associated with a decline in the tax rate. Rather, a decline in the former was associated with an actual increase in the tax rate in the last two years. Figure 8 presents the results as coefficient plots, allowing us to see how the relationship between tax rate and state aid has grown more negative after the Great Recession.

Next, we apply the same instrumental variables strategy as before. The results remain very similar. In the IV regressions presented in columns 4 – 6, the positive pre-recession effect is

gone, while the negative post-recession relationship is still there and still significant (both economically and statistically). In other words, the IV regressions reveal a considerably stronger compensatory relationship between state aid per pupil and local tax rate. Figure 9 presents the corresponding coefficients and makes the downward trend of the state aid/tax rate relationship in the post-recession period clear.

5 Conclusion

In this paper, we analyzed how the Great Recession changed the relationship between state aid and local revenues, specifically looking at how changes in state aid before and after the recession had varying impacts on local revenue and property taxes. This analysis uncovered some interesting patterns. We find that the relationship between state aid per pupil and local revenue (or property tax revenue) changed markedly with the Great Recession. The post-recession era was characterized by local governments proactively increasing taxes (relative to that in the pre-recession period) for an equivalent decrease in state aid per pupil. By allowing the effects of state aid to vary across years, we find that this pattern is not driven by a single year effect, rather this is a consistent pattern reflected in each year after the recession.

By separately analyzing the driver of property tax revenue—the property tax rate—we find that changes in state aid per-pupil consistently affected the tax rate, suggesting that districts do respond to changes in state aid. In fact, the compensatory relationship became stronger over the years.

We further bolster the robustness of our results by conducting an instrumental variables estimation, using the four-year lag of state aid as an instrument. The IV results confirm the earlier results—the coefficient magnitudes also remain broadly similar to those obtained above. Thus, we find robust evidence that state aid does affect local decision-making when it comes

time to set taxes. The findings of this study have the potential to inform policy decisions at the state and local level. Because of its clear effect on local revenue decisions under fiscal duress, the state's decision about how much to spend on education under such circumstances has broader impacts and implications that policymakers should consider when planning education financing.

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Table 1: Summary Statistics in the Immediate Pre-Recession Year (2008)

	Mean	Median	25^{th} Percentile	75^{th} Percentile
State Aid Per Pupil	8430.1	8541.7	5325.7	11410.4
	(3949.3)			
Property Tax Revenue Per Pupil	10881.8	7277.3	4649.9	12978.2
	(12405.6)			
Local Funding Per Pupil	13989.2	9981.9	7218.3	16420.3
	(13586.0)			
Tax Rate (per $000)	16.1	16.2	13.1	19.3
	(5.2)			
% Black	5.6	2.0	1.0	4.0
	(10.8)			
% Hispanic	6.1	2.0	1.0	7.0
	(10.0)			
% Asian	2.5	1.0	1.0	3.0
	(4.2)			
% Am. Indian	0.5	0.00	0.00	0.0
	(3.4)			
% Free/Reduced Lunch	28.6	29.0	13.0	41.0
	(18.1)			
% State Aid	40.6	43.4	24.8	57.3
	(19.8)			
Number of School Districts	673			

Table 2: Did Property Taxes and Local Revenue Respond to State Aid Cuts During the Great Recession? (Using School District Fixed Effects)

	Local Funding Per Pupil FE (1)	Property Tax Revenue Per Pupil FE (2)	Local Funding Per Pupil FE (3)	Property Tax Revenue Per Pupil FE (4)	Local Funding Per Pupil FE (5)	Property Tax Revenue Per Pupil FE (6)
State Aid Per Pupil	3.30**	2.39	3.31**	2.40	3.99**	2.87
	(1.52)	(1.58)	(1.52)	(1.57)	(1.70)	(1.77)
State Aid PP * Recession	-0.41**	-0.29*				
	(0.18)	(0.17)				
State Aid PP * 2006					-0.21***	-0.08*
					(0.06)	(0.04)
State Aid PP * 2007					-0.62***	-0.42**
					(0.20)	(0.20)
State Aid PP * 2008					-0.69***	-0.48**
					(0.22)	(0.23)
State Aid PP * 2009			-0.46*	-0.36	-0.91**	-0.66*
			(0.26)	(0.25)	(0.38)	(0.37)
State Aid PP * 2010			-0.50*	-0.37	-0.96**	-0.67*
			(0.26)	(0.26)	(0.38)	(0.39)
State Aid PP * 2011			-0.42**	-0.28*	-0.87***	-0.58*
			(0.18)	(0.17)	(0.29)	(0.30)
State Aid PP * 2012			-0.26***	-0.13*	-0.72***	-0.43***
			(0.10)	(0.07)	(0.16)	(0.15)
Observations	5532	5532	5532	5532	5532	5532
R^2	0.92	0.92	0.92	0.92	0.92	0.92

Notes: *, **, *** denote statistical significance at the 10, 5, and 1% level, respectively. Robust standard errors adjusted for clustering by school district are in parentheses. All regressions include racial composition, the percent of students eligible for free or reduced price lunch, and the percent of district funding from state aid.

Table 3: Did Property Taxes and Local Revenue Respond to State Aid Cuts During the Great Recession? (Using Instrumental Variables)

	Local Funding Per Pupil IV	Property Tax Revenue Per Pupil IV	Local Funding Per Pupil IV	Property Tax Revenue Per Pupil IV	Local Funding Per Pupil IV	Property Tax Revenue Per Pupil IV
	(1)	(2)	(3)	(4)	(5)	(6)
State Aid Per Pupil	2.41***	2.67***	2.41***	2.66***	2.66***	2.86***
	(0.66)	(0.71)	(0.65)	(0.70)	(0.19)	(0.75)
State Aid PP * Recession	-0.35***	-0.31***				
	(0.10)	(0.09)				
State Aid PP * 2006					-0.09	0.00
					(0.18)	(0.10)
State Aid PP * 2007					-0.40**	-0.31**
					(0.17)	(0.13)
State Aid PP * 2008					-0.41**	-0.39***
					(0.17)	(0.13)
State Aid PP * 2009			-0.34***	-0.32***	-0.58***	-0.51***
			(0.12)	(0.10)	(0.17)	(0.17)
State Aid PP * 2010			-0.41***	-0.39***	-0.65***	-0.57***
			(0.13)	(0.13)	(0.17)	(0.19)
State Aid PP * 2011			-0.38***	-0.32***	-0.62***	-0.51***
			(0.10)	(0.10)	(0.17)	(0.15)
State Aid PP * 2012			-0.26**	-0.21***	-0.50***	-0.40***
			(0.10)	(0.08)	(0.17)	(0.13)
Observations	5530	5530	5530	5530	5530	5530

Notes: *, **, *** denote statistical significance at the 10, 5, and 1% level, respectively. Robust standard errors adjusted for clustering by school district are in parentheses. All regressions include racial composition, the percent of students eligible for free or reduced price lunch, and the percent of district funding from state aid.

Table 4: Did Property Tax Rates Respond to State Aid Cuts During the Great Recession?

	FE			IV		
	Tax Rate	Tax Rate	Tax Rate	Tax Rate	Tax Rate	Tax Rate
	(1)	(2)	(3)	(4)	(5)	(6)
State Aid Per Pupil	0.00030***	0.00029***	0.00028***	-0.00005	-0.00004	-0.00009
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
State Aid PP * Recession	-0.00025***			-0.00019***		
	(0.000)			(0.000)		
State Aid PP * 2006			0.00005***			0.00006
			(0.000)			(0.000)
State Aid PP * 2007			0.00003			0.00009
			(0.000)			(0.000)
State Aid PP * 2008			-0.00001			0.00006
			(0.000)			(0.000)
State Aid PP * 2009		-0.00013***	-0.00011***		-0.00006**	-0.00001
		(0.000)	(0.000)		(0.000)	(0.000)
State Aid PP * 2010		-0.00022***	-0.00021***		-0.00014***	-0.00008
		(0.000)	(0.000)		(0.000)	(0.000)
State Aid PP * 2011		-0.00031***	-0.00029***		-0.00025***	-0.00020***
		(0.000)	(0.000)		(0.000)	(0.000)
State Aid PP * 2012		-0.00034***	-0.00032***		-0.00030***	-0.00025***
		(0.000)	(0.000)		(0.000)	(0.000)
Observations	5406	5406	5406	5404	5404	5404
R^2	0.93	0.94	0.94			

Notes: *, **, *** denote statistical significance at the 10, 5, and 1% level, respectively. Robust standard errors adjusted for clustering by school district are in parentheses. All regressions include racial composition, the percent of students eligible for free or reduced price lunch, and the percent of district funding from state aid.

Figure 1: Primary District Funding Sources, 2005-2012

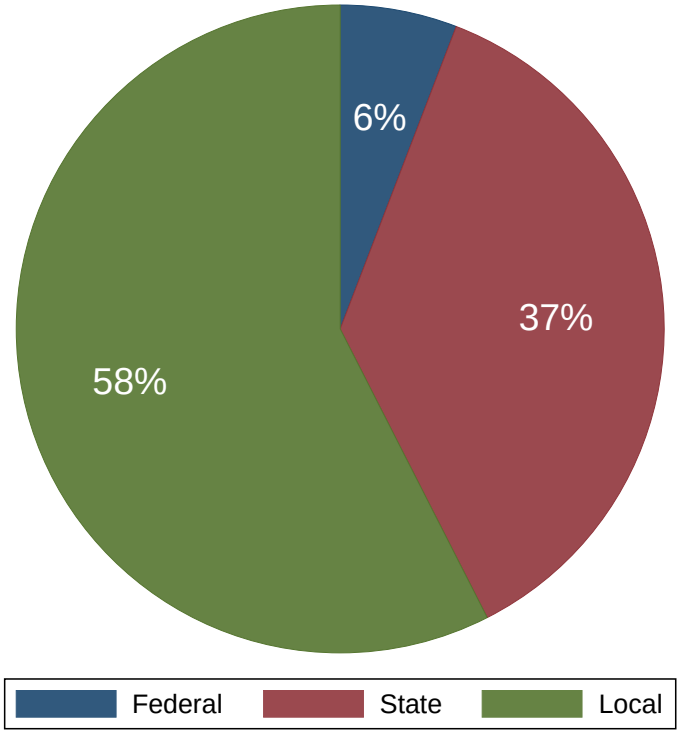


Figure 2: Chronology of State and Local Funding in a representative year (2011-2012 School Year)

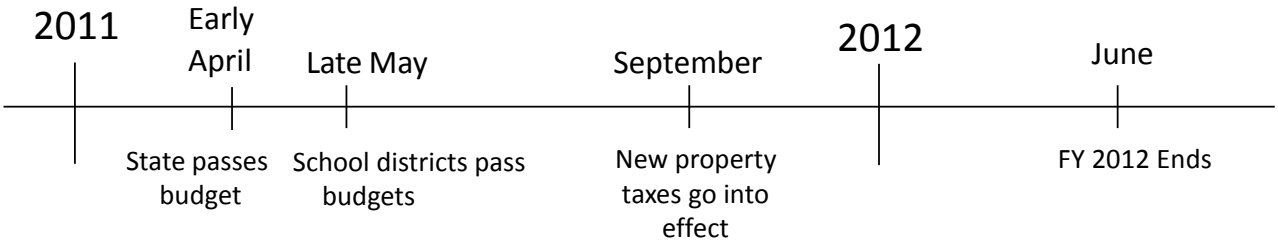


Figure 3: Trends in State and Local Funding

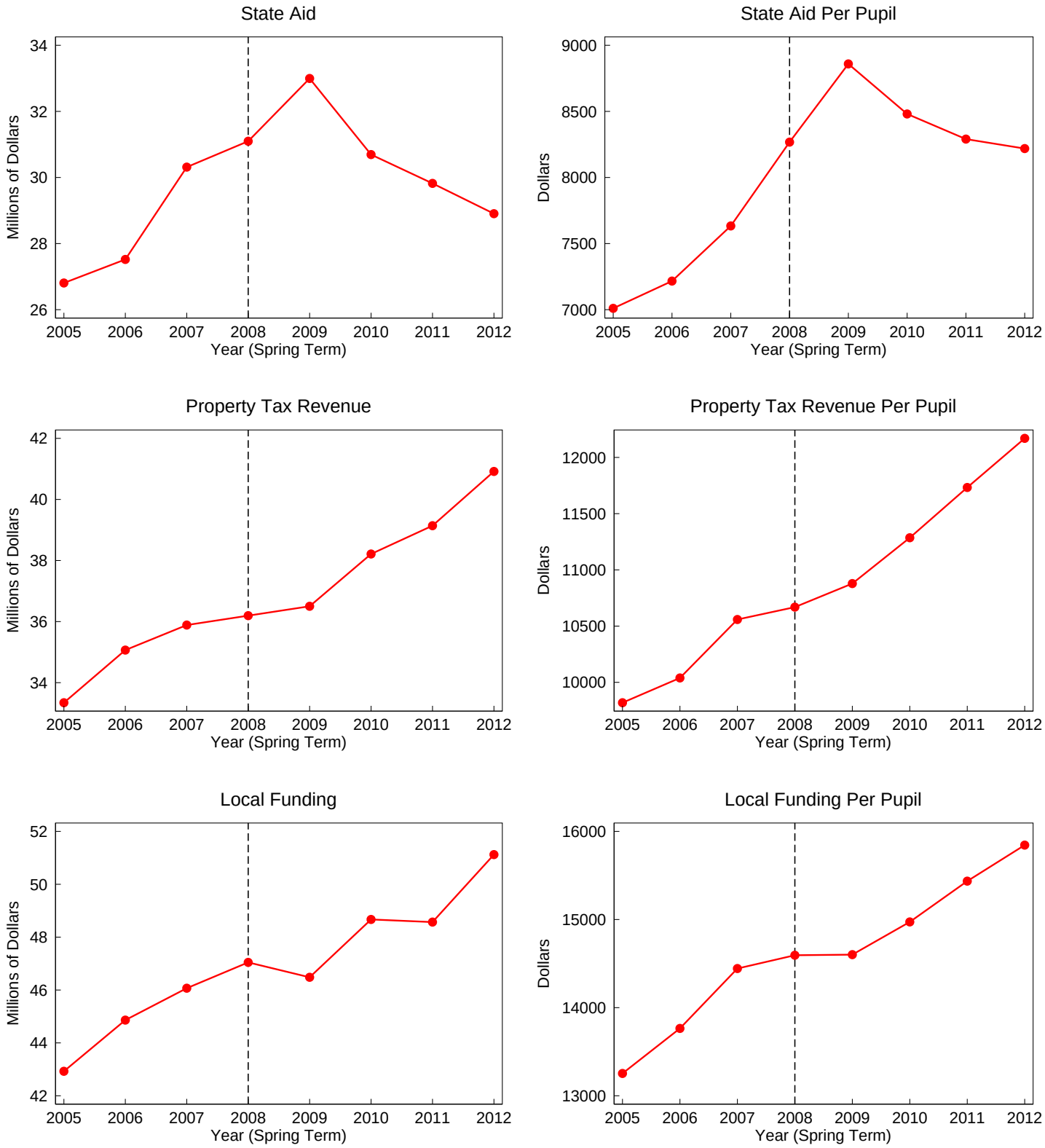


Figure 4: Yearly Scatterplots

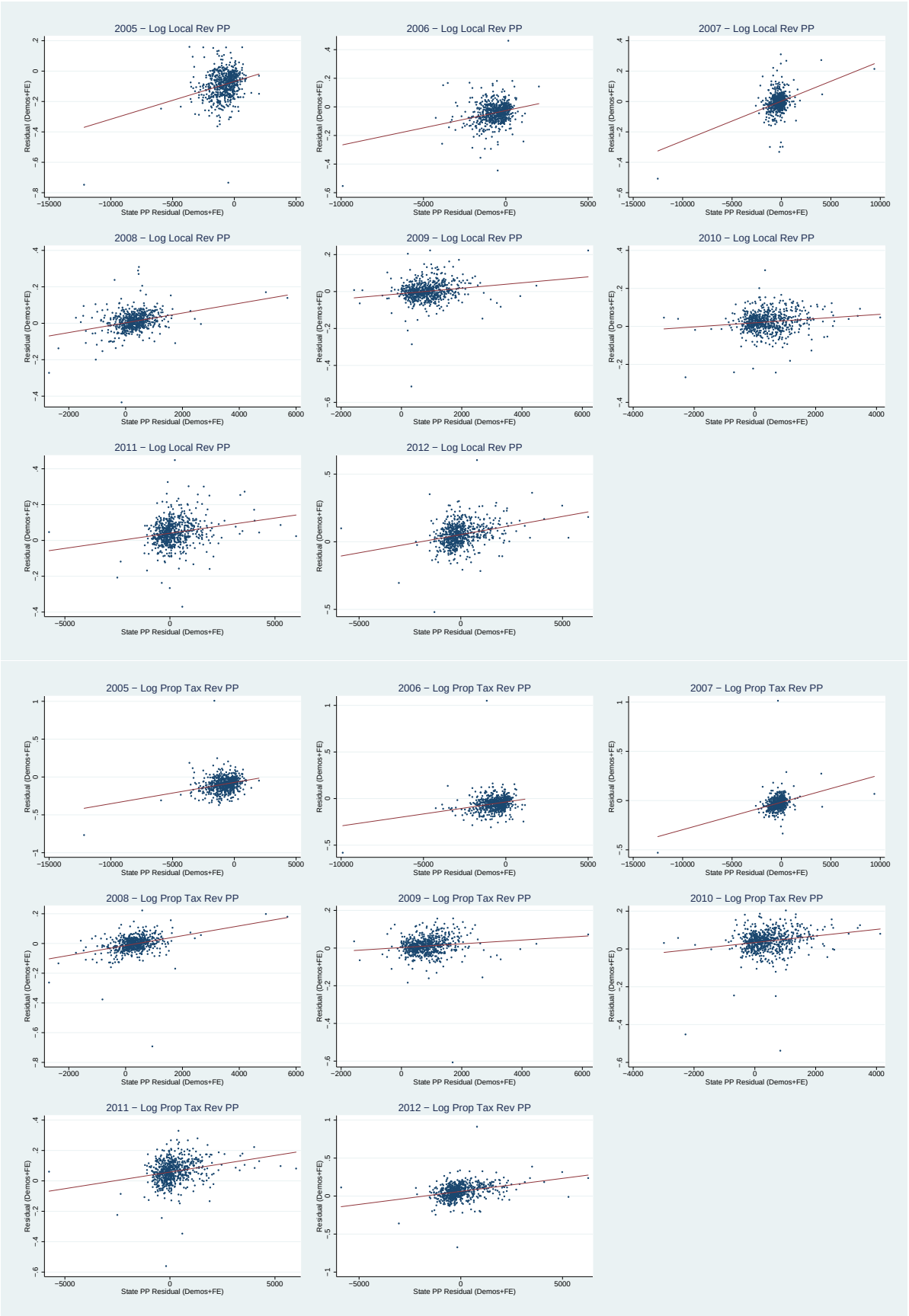
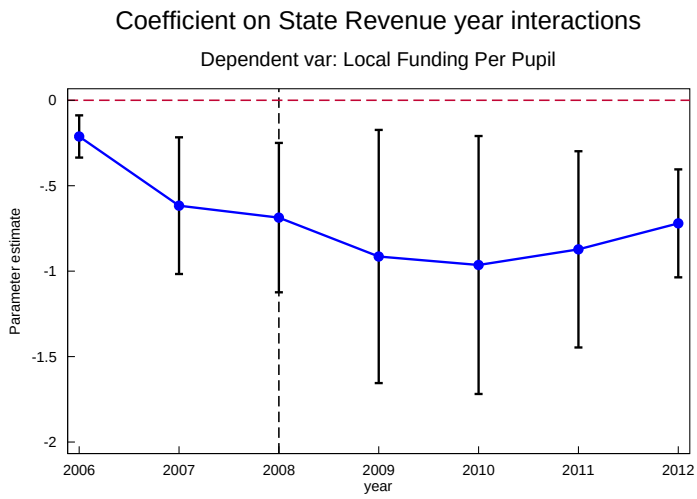


Figure 5: Coefficient Plots (FE, corresponding to Table 2)



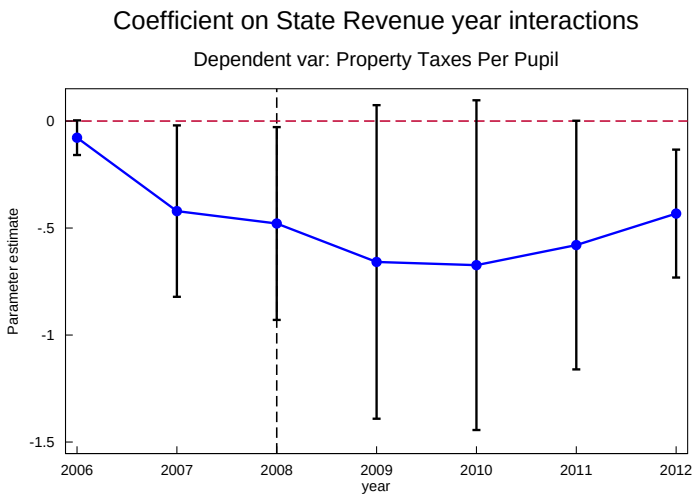
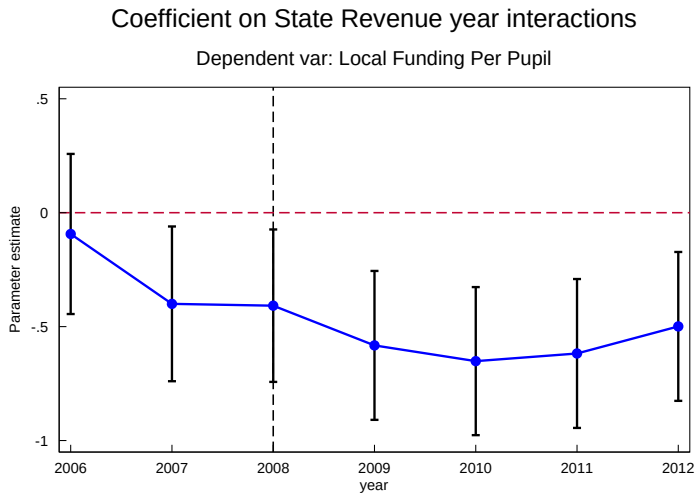


Figure 6: Coefficient Plots (IV, corresponding to Table 3)



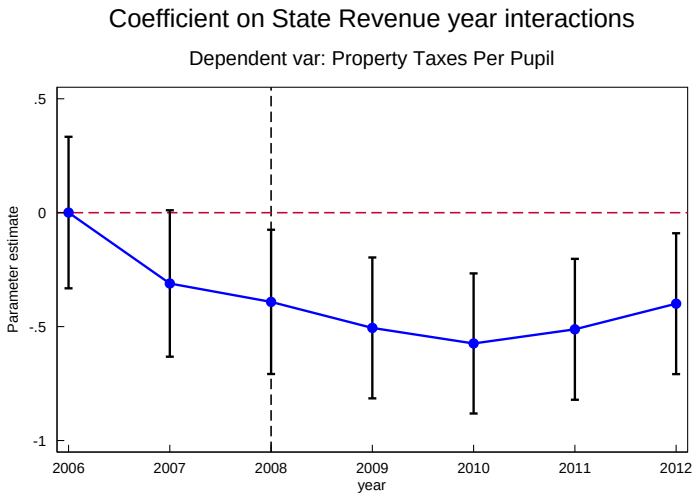


Figure 7: Trends in Property Tax Rates

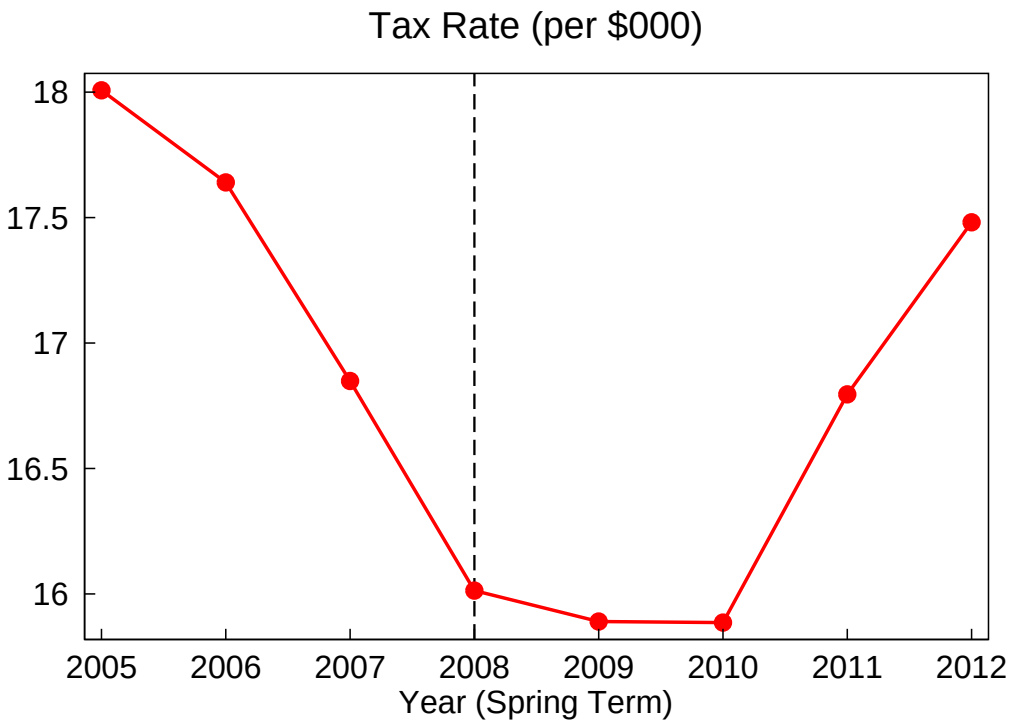


Figure 8: Coefficient Plots (FE, corresponding to Table 4)

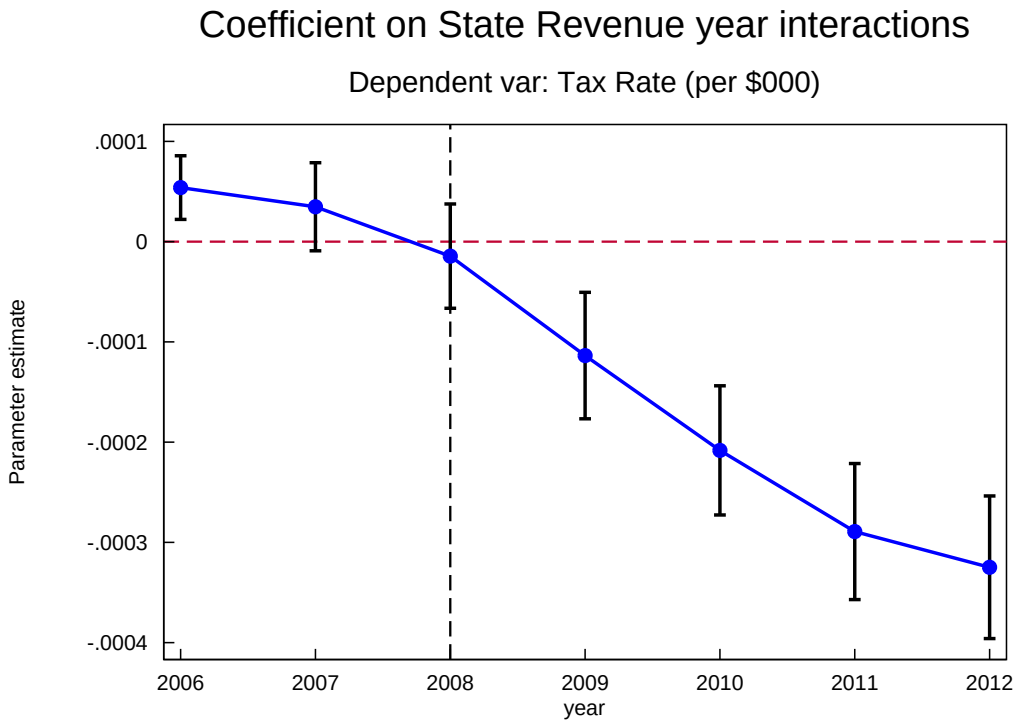


Figure 9: Coefficient Plots (IV, corresponding to Table 4)